

E.coli. seq. 1.ST25.txt  
SEQUENCE LISTING

<110> Pantherix Limited  
Primrose, William Ure  
Ali, Sohail Tahir  
Maclean, John Kinnaird

<120> Crystal Structures of Chorismate Synthase

<130> 7181-1

<140> US/10/529,196

<141> 2004-03-24

<160> 19

<170> PatentIn version 3.3

<210> 1

<211> 359

<212> PRT

<213> Escherichia coli

<400> 1

Ala Gly Asn Thr Ile Gly Gln Leu Phe Arg Val Thr Thr Phe Gly Glu  
1 5 10 15

Ser His Gly Leu Ala Leu Gly Cys Ile Val Asp Gly Val Pro Pro Gly  
20 25 30

Ile Pro Leu Thr Gln Ala Asp Leu Gln His Asp Leu Asp Arg Arg Arg  
35 40 45

Pro Gly Thr Arg Tyr Thr Thr Gln Arg Arg Glu Pro Asp Gln Val Lys  
50 55 60

Ile Leu Ser Gly Val Phe Glu Gly Val Thr Thr Gly Thr Ser Ile Gly  
65 70 75 80

Leu Leu Ile Glu Asn Thr Asp Gln Arg Ser Gln Asp Tyr Ser Ala Ile  
85 90 95

Lys Asp Val Phe Arg Pro Gly His Ala Asp Tyr Thr Tyr Glu Gln Lys  
100 105 110

Tyr Gly Leu Arg Asp Tyr Arg Gly Gly Gly Arg Ser Ser Ala Arg Glu  
115 120 125

Thr Ala Met Arg Val Ala Ala Gly Ala Ile Ala Lys Lys Tyr Leu Ala  
130 135 140

Glu Lys Phe Gly Ile Glu Ile Arg Gly Cys Leu Thr Gln Met Gly Asp  
145 150 155 160

Page 1

## E.coli. seq. 1.ST25.txt

Ile Pro Leu Asp Ile Lys Asp Trp Ser Gln Val Glu Gln Asn Pro Phe  
165 170 175

Phe Cys Pro Asp Pro Asp Lys Ile Asp Ala Leu Asp Glu Leu Met Arg  
180 185 190

Ala Leu Lys Lys Glu Gly Asp Ser Ile Gly Ala Lys Val Thr Val Val  
195 200 205

Ala Ser Gly Val Pro Ala Gly Leu Gly Glu Pro Val Phe Asp Arg Leu  
210 215 220

Asp Ala Asp Ile Ala His Ala Leu Met Ser Ile Asn Ala Val Lys Gly  
225 230 235 240

Val Glu Ile Gly Asp Gly Phe Asp Val Val Ala Leu Arg Gly Ser Gln  
245 250 255

Asn Arg Asp Glu Ile Thr Lys Asp Gly Phe Gln Ser Asn His Ala Gly  
260 265 270

Gly Ile Leu Gly Gly Ile Ser Ser Gly Gln Gln Ile Ile Ala His Met  
275 280 285

Ala Leu Lys Pro Thr Ser Ser Ile Thr Val Pro Gly Arg Thr Ile Asn  
290 295 300

Arg Phe Gly Glu Glu Val Glu Met Ile Thr Lys Gly Arg His Asp Pro  
305 310 315 320

Cys Val Gly Ile Arg Ala Val Pro Ile Ala Glu Ala Met Leu Ala Ile  
325 330 335

Val Leu Met Asp His Leu Leu Arg Gln Arg Ala Gln Asn Ala Asp Val  
340 345 350

Lys Thr Asp Ile Pro Arg Trp  
355

<210> 2  
<211> 388  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 2

Met Arg Tyr Leu Thr Ala Gly Glu Ser His Gly Pro Arg Leu Thr Ala  
1 5 10 15

## E.coli. seq. 1.ST25.txt

Ile Ile Glu Gly Ile Pro Ala Gly Leu Pro Leu Thr Ala Glu Asp Ile  
20 25 30  
Asn Glu Asp Leu Arg Arg Arg Gln Gly Gly Tyr Gly Arg Gly Gly Arg  
35 40 45  
Met Lys Ile Glu Asn Asp Gln Val Val Phe Thr Ser Gly Val Arg His  
50 55 60  
Gly Lys Thr Thr Gly Ala Pro Ile Thr Met Asp Val Ile Asn Lys Asp  
65 70 75 80  
His Gln Lys Trp Leu Asp Ile Met Ser Ala Glu Asp Ile Glu Asp Arg  
85 90 95  
Leu Lys Ser Lys Arg Lys Ile Thr His Pro Arg Pro Gly His Ala Asp  
100 105 110  
Leu Val Gly Gly Ile Lys Tyr Arg Phe Asp Asp Leu Arg Asn Ser Leu  
115 120 125  
Glu Arg Ser Ser Ala Arg Glu Thr Thr Met Arg Val Ala Val Gly Ala  
130 135 140  
Val Ala Lys Arg Leu Leu Ala Glu Leu Asp Met Glu Ile Ala Asn His  
145 150 155 160  
Val Val Val Phe Gly Gly Lys Glu Ile Asp Val Pro Glu Asn Leu Thr  
165 170 175  
Val Ala Glu Ile Lys Gln Arg Ala Ala Gln Ser Glu Val Ser Ile Val  
180 185 190  
Asn Gln Glu Arg Glu Gln Glu Ile Lys Asp Tyr Ile Asp Gln Ile Lys  
195 200 205  
Arg Asp Gly Asp Thr Ile Gly Gly Val Val Glu Thr Val Val Gly Gly  
210 215 220  
Val Pro Val Gly Leu Gly Ser Tyr Val Gln Trp Asp Arg Lys Leu Asp  
225 230 235 240  
Ala Arg Leu Ala Gln Ala Val Val Ser Ile Asn Ala Phe Lys Gly Val  
245 250 255  
Glu Phe Gly Leu Gly Phe Glu Ala Gly Tyr Arg Lys Gly Ser Gln Val  
Page 3

E.coli. seq. 1.ST25.txt  
265 270

260

Met Asp Glu Ile Leu Trp Ser Lys Glu Asp Gly Tyr Thr Arg Arg Thr  
275 280 285Asn Asn Leu Gly Gly Phe Glu Gly Gly Met Thr Asn Gly Gln Pro Ile  
290 295 300Val Val Arg Gly Val Met Lys Pro Ile Pro Thr Leu Tyr Lys Pro Leu  
305 310 315 320Met Ser Val Asp Ile Glu Thr His Glu Pro Tyr Lys Ala Thr Val Glu  
325 330 335Arg Ser Asp Pro Thr Ala Leu Pro Ala Ala Gly Met Val Met Glu Ala  
340 345 350Val Val Ala Thr Val Leu Ala Gln Glu Ile Leu Glu Lys Phe Ser Ser  
355 360 365Asp Asn Leu Glu Glu Leu Lys Glu Ala Val Ala Lys His Arg Asp Tyr  
370 375 380Thr Lys Asn Tyr  
385<210> 3  
<211> 388  
<212> PRT  
<213> Enterococcus faecalis

&lt;400&gt; 3

Met Arg Phe Ile Thr Ala Gly Glu Ser His Gly Pro Glu Leu Thr Ala  
1 5 10 15Ile Ile Glu Gly Leu Pro Ala Gly Leu Pro Leu Ser Ser Glu Glu Ile  
20 25 30Asn Arg Glu Leu Ala Arg Arg Gln Gly Gly Tyr Gly Arg Gly Gly Arg  
35 40 45Met Lys Ile Glu Lys Asp Gln Val Arg Ile Thr Ser Gly Ile Arg His  
50 55 60Gly Lys Thr Leu Gly Ser Pro Val Thr Leu Ile Val Glu Asn Lys Asp  
65 70 75 80Trp Lys Asn Trp Thr Ser Val Met Ser Val Glu Pro Val Pro Glu Lys  
Page 4

## E.coli. seq. 1.ST25.txt

85

90

95

Gln Lys Lys Ile Arg Arg Val Ser Lys Pro Arg Pro Gly His Ala Asp  
100 105 110

Leu Val Gly Gly Met Lys Tyr Gln His Asp Asp Leu Arg Asn Val Leu  
115 120 125

Glu Arg Ser Ser Ala Arg Glu Thr Thr Met Arg Val Ala Ile Gly Ala  
130 135 140

Val Ala Lys Lys Leu Leu Ala Glu Leu Asp Ile Gln Val Ala Gly His  
145 150 155 160

Val Ala Val Leu Gly Gly Ile Glu Ala Thr Ile Pro Glu Asn Leu Thr  
165 170 175

Ile Arg Glu Ile Gln Glu Arg Ser Glu Gln Ser Ala Val Arg Val Leu  
180 185 190

Asp Pro Ser Val Glu Glu Lys Met Lys Glu Leu Ile Asp Gln Thr Lys  
195 200 205

Lys Asn Gly Asp Thr Ile Gly Gly Val Val Glu Val Leu Val Gly Gly  
210 215 220

Val Pro Ala Gly Leu Gly Ser Tyr Val Gln Trp Asp Arg Lys Leu Asp  
225 230 235 240

Ala Lys Ile Ala Gln Ala Val Val Ser Ile Asn Ala Phe Thr Gly Ala  
245 250 255

Glu Phe Gly Ile Gly Phe Glu Met Ala Gln Arg Ile Gly Ser Gln Leu  
260 265 270

Met Asp Glu Ile Val Trp Asp Glu Ser Thr Gly Tyr Thr Arg Thr Ser  
275 280 285

Asn Asn Leu Gly Gly Phe Glu Gly Gly Met Thr Asn Gly Met Pro Ile  
290 295 300

Ile Val Arg Gly Val Met Lys Pro Ile Pro Thr Leu Tyr Lys Pro Leu  
305 310 315 320

Gln Ser Val Asn Ile Asp Thr Lys Glu Pro Tyr Lys Ala Ser Val Glu  
325 330 335

## E.coli. seq. 1.ST25.txt

Arg Ser Asp Ser Thr Ala Val Pro Ala Ala Ser Val Val Cys Glu Ala  
340 345 350

Val Val Ala Thr Glu Val Ala Lys Ala Met Leu Glu Lys Phe Asp Ser  
355 360 365

Asp Ser Phe Glu Gln Met Lys Glu Ala Val Lys Arg Tyr Arg Leu Tyr  
370 375 380

Thr Gln Asn Phe  
385

<210> 4  
<211> 388  
<212> PRT  
<213> Staphylococcus aureus  
<400> 4

Met Arg Tyr Leu Thr Ser Gly Glu Ser His Gly Pro Gln Leu Thr Val  
1 5 10 15

Ile Val Glu Gly Val Pro Ala Asn Leu Glu Val Lys Val Glu Asp Ile  
20 25 30

Asn Lys Glu Met Phe Lys Arg Gln Gly Gly Tyr Gly Arg Gly Arg Arg  
35 40 45

Met Gln Ile Glu Lys Asp Thr Val Glu Ile Val Ser Gly Val Arg Asn  
50 55 60

Gly Tyr Thr Leu Gly Ser Pro Ile Thr Met Val Val Thr Asn Asp Asp  
65 70 75 80

Phe Thr His Trp Arg Lys Ile Met Gly Arg Ala Pro Ile Ser Asp Glu  
85 90 95

Glu Arg Glu Asn Met Lys Arg Thr Ile Thr Lys Pro Arg Pro Gly His  
100 105 110

Ala Asp Leu Leu Gly Gly Met Lys Tyr Asn His Arg Asp Leu Arg Asn  
115 120 125

Val Leu Glu Arg Ser Ser Ala Arg Glu Thr Ala Ala Arg Val Ala Val  
130 135 140

Gly Ala Leu Cys Lys Val Leu Leu Glu Gln Leu Asp Ile Glu Ile Tyr  
145 150 155 160

## E.coli. seq. 1.ST25.txt

Ser Arg Val Val Glu Ile Gly Gly Ile Lys Asp Lys Asp Phe Tyr Asp  
 165 170 175

Ser Glu Thr Phe Lys Ala Asn Leu Asp Arg Asn Asp Val Arg Val Ile  
 180 185 190

Asp Asp Gly Ile Ala Gln Ala Met Arg Asp Lys Ile Asp Glu Ala Lys  
 195 200 205

Thr Asp Gly Asp Ser Ile Gly Gly Val Val Gln Val Val Val Glu Asn  
 210 215 220

Met Pro Val Gly Val Gly Ser Tyr Val His Tyr Asp Arg Lys Leu Asp  
 225 230 235 240

Gly Arg Ile Ala Gln Gly Val Val Ser Ile Asn Ala Phe Lys Gly Val  
 245 250 255

Ser Phe Gly Glu Gly Phe Lys Ala Ala Glu Lys Pro Gly Ser Glu Ile  
 260 265 270

Gln Asp Glu Ile Leu Tyr Asn Thr Glu Leu Gly Tyr Tyr Arg Gly Ser  
 275 280 285

Asn His Leu Gly Gly Leu Glu Gly Gly Met Ser Asn Gly Met Pro Ile  
 290 295 300

Ile Val Asn Gly Val Met Lys Pro Ile Pro Thr Leu Tyr Lys Pro Leu  
 305 310 315 320

Asn Ser Val Asp Ile Asn Thr Lys Glu Asp Phe Lys Ala Thr Ile Glu  
 325 330 335

Arg Ser Asp Ser Cys Ala Val Pro Ala Ala Ser Ile Val Cys Glu His  
 340 345 350

Val Val Ala Phe Ala Ile Ala Lys Ala Leu Leu Glu Glu Phe Gln Ser  
 355 360 365

Asn His Ile Glu Gln Leu Lys Gln Gln Ile Ile Glu Arg Arg Gln Leu  
 370 375 380

Asn Val Glu Phe  
 385

<210> 5  
 <211> 368  
 <212> PRT

## E.coli. seq. 1.ST25.txt

&lt;213&gt; Bacillus subtilis

&lt;400&gt; 5

Met Arg Tyr Leu Thr Ala Gly Glu Ser His Gly Pro Gln Leu Thr Thr  
1 5 10 15

Ile Ile Glu Gly Val Pro Ala Gly Leu Tyr Ile Thr Glu Glu Asp Ile  
20 25 30

Asn Phe Glu Leu Ala Arg Arg Gln Lys Gly His Gly Arg Gly Arg Arg  
35 40 45

Met Gln Ile Glu Lys Asp Gln Ala Lys Ile Met Ser Gly Val Arg His  
50 55 60

Ala Arg Thr Leu Gly Ser Pro Ile Ala Leu Val Val Glu Asn Asn Asp  
65 70 75 80

Trp Lys His Trp Thr Lys Ile Met Gly Ala Ala Pro Ile Thr Glu Asp  
85 90 95

Glu Glu Lys Glu Met Lys Arg Gln Ile Ser Arg Pro Arg Pro Gly His  
100 105 110

Ala Asp Leu Asn Gly Ala Ile Lys Tyr Asn His Arg Asp Met Arg Asn  
115 120 125

Val Leu Glu Arg Ser Ser Ala Arg Glu Thr Thr Val Arg Val Ala Ala  
130 135 140

Gly Ala Val Ala Lys Lys Ile Leu Ser Glu Leu Gly Ile Lys Val Ala  
145 150 155 160

Gly His Val Leu Gln Ile Gly Ala Val Lys Ala Glu Lys Thr Gly Tyr  
165 170 175

Thr Ser Ile Glu Asp Leu Gln Arg Val Thr Glu Glu Ser Pro Val Arg  
180 185 190

Cys Tyr Asp Glu Glu Ala Gly Lys Lys Met Met Ala Ala Ile Asp Glu  
195 200 205

Ala Lys Ala Asn Gly Asp Ser Ile Gly Gly Ile Val Glu Val Ile Val  
210 215 220

Glu Gly Met Pro Val Gly Val Gly Ser Tyr Val His Tyr Asp Arg Lys  
225 230 235 240



## E.coli. seq. 1.ST25.txt

Leu Asp Ser Lys Leu Ala Ala Ala Val Leu Ser Ile Asn Ala Phe Lys  
245 250 255  
Gly Val Glu Phe Gly Ile Gly Phe Glu Ala Ala Gly Arg Asn Gly Ser  
260 265 270  
Glu Val His Asp Glu Ile Ile Trp Asp Glu Glu Lys Gly Tyr Thr Arg  
275 280 285  
Ala Thr Asn Arg Leu Gly Gly Leu Glu Gly Gly Met Thr Thr Gly Met  
290 295 300  
Pro Ile Val Val Arg Gly Val Met Lys Pro Ile Pro Thr Leu Tyr Lys  
305 310 315 320  
Pro Leu Lys Ser Val Asp Ile Glu Thr Lys Glu Pro Phe Ser Ala Ser  
325 330 335  
Ile Glu Arg Ser Asp Ser Cys Ala Val Pro Ala Ala Ser Val Val Ala  
340 345 350  
Glu Ala Leu Ser Leu Gly Lys Leu Gln Pro Ser Leu Asn Asn Ser Asp  
355 360 365

<210> 6  
<211> 527  
<212> PRT  
<213> Plasmodium falciparum

<400> 6

Met Ser Thr Tyr Gly Thr Leu Leu Lys Val Thr Ser Tyr Gly Glu Ser  
1 5 10 15  
His Gly Lys Ala Ile Gly Cys Val Ile Asp Gly Phe Leu Ser Asn Ile  
20 25 30  
Glu Ile Asn Phe Asp Leu Ile Gln Lys Gln Leu Asp Arg Arg Arg Pro  
35 40 45  
Asn Gln Ser Lys Leu Thr Ser Asn Arg Asn Glu Lys Asp Lys Leu Val  
50 55 60  
Ile Leu Ser Gly Phe Asp Glu Asn Lys Thr Leu Gly Thr Pro Ile Thr  
65 70 75 80  
Phe Leu Ile Tyr Asn Glu Asp Ile Lys Lys Glu Asp Tyr Asn Ser Phe  
85 90 95

## E.coli. seq. 1.ST25.txt

Ile Asn Ile Pro Arg Pro Gly His Gly Asp Tyr Thr Tyr Phe Met Lys  
 100 105 110  
 Tyr His Val Lys Asn Lys Ser Gly Ser Ser Arg Phe Ser Gly Arg Glu  
 115 120 125  
 Thr Ala Thr Arg Val Ala Ala Gly Ala Cys Ile Glu Gln Trp Leu Tyr  
 130 135 140  
 Lys Ser Tyr Asn Cys Ser Ile Val Ser Tyr Val His Ser Val Gly Asn  
 145 150 155 160  
 Ile Lys Ile Pro Glu Gln Val Ser Lys Glu Leu Glu Asn Lys Asn Pro  
 165 170 175  
 Pro Ser Arg Asp Leu Val Asp Ser Tyr Gly Thr Val Arg Tyr Asn Glu  
 180 185 190  
 Lys Glu Lys Ile Phe Met Asp Cys Phe Asn Arg Ile Tyr Asp Met Asn  
 195 200 205  
 Ala Ser Met Leu Lys Thr Asp Glu Tyr Asn Lys Asn Thr Leu Thr Ile  
 210 215 220  
 Pro Ser Ile Asp Asn Thr Tyr Ile Asn Val Lys Thr Asn Glu Cys Asn  
 225 230 235 240  
 Ile Asn Gln Val Asp Asn Asn His Asn Asn Tyr Ile Asn Asp Lys Asp  
 245 250 255  
 Asn Thr Phe Asn Asn Ser Glu Lys Ser Asp Glu Trp Ile Tyr Leu Gln  
 260 265 270  
 Thr Arg Cys Pro His Pro Tyr Thr Ala Val Gln Ile Cys Ser Tyr Ile  
 275 280 285  
 Leu Lys Leu Lys Asn Lys Gly Asp Ser Val Gly Gly Ile Ala Thr Cys  
 290 295 300  
 Ile Ile Gln Asn Pro Pro Ile Gly Ile Gly Glu Pro Ile Phe Asp Lys  
 305 310 315 320  
 Leu Glu Ala Glu Leu Ala Lys Met Ile Leu Ser Ile Pro Pro Val Lys  
 325 330 335  
 Gly Ile Glu Phe Gly Ser Gly Phe Asn Gly Thr Tyr Met Phe Gly Ser  
 340 345 350

Page 10

## E.coli. seq. 1.ST25.txt

Met His Asn Asp Ile Phe Ile Pro Val Glu Asn Met Ser Thr Lys Lys  
355 360 365

Glu Ser Asp Leu Leu Tyr Asp Asp Lys Gly Glu Cys Lys Asn Met Ser  
370 375 380

Tyr His Ser Thr Ile Gln Asn Asn Glu Asp Gln Ile Leu Asn Ser Thr  
385 390 395 400

Lys Gly Phe Met Pro Pro Lys Asn Asp Lys Asn Phe Asn Asn Ile Asp  
405 410 415

Asp Tyr Asn Val Thr Phe Asn Asn Asn Glu Glu Lys Leu Leu Ile Thr  
420 425 430

Lys Thr Asn Asn Cys Gly Gly Ile Leu Ala Gly Ile Ser Thr Gly Asn  
435 440 445

Asn Ile Val Phe Arg Ser Ala Ile Lys Pro Val Ser Ser Ile Gln Ile  
450 455 460

Glu Lys Glu Thr Ser Asp Phe Tyr Gly Asn Met Cys Asn Leu Lys Val  
465 470 475 480

Gln Gly Arg His Asp Ser Cys Ile Leu Pro Arg Leu Pro Pro Ile Ile  
485 490 495

Glu Ala Ser Ser Ser Met Val Ile Gly Asp Leu Ile Leu Arg Gln Ile  
500 505 510

Ser Lys Tyr Gly Asp Lys Lys Leu Pro Thr Leu Phe Arg Asn Met  
515 520 525

<210> 7  
<211> 401  
<212> PRT  
<213> Mycobacterium tuberculosis  
<400> 7

Met Leu Arg Trp Ile Thr Ala Gly Glu Ser His Gly Arg Ala Leu Val  
1 5 10 15

Ala Val Val Glu Gly Met Val Ala Gly Val His Val Thr Ser Ala Asp  
20 25 30

Ile Ala Asp Gln Leu Ala Arg Arg Arg Leu Gly Tyr Gly Arg Gly Ala  
35 40 45

## E.coli. seq. 1.ST25.txt

Arg Met Thr Phe Glu Arg Asp Ala Val Thr Val Leu Ser Gly Ile Arg  
50 55 60

His Gly Ser Thr Leu Gly Gly Pro Ile Ala Ile Glu Ile Gly Asn Thr  
65 70 75 80

Glu Trp Pro Lys Trp Glu Thr Val Met Ala Ala Asp Pro Val Asp Pro  
85 90 95

Ala Glu Leu Ala Asp Val Ala Arg Asn Ala Pro Leu Thr Arg Pro Arg  
100 105 110

Pro Gly His Ala Asp Tyr Ala Gly Met Leu Lys Tyr Gly Phe Asp Asp  
115 120 125

Ala Arg Pro Val Leu Glu Arg Ala Ser Ala Arg Glu Thr Ala Ala Arg  
130 135 140

Val Ala Ala Gly Thr Val Ala Arg Ala Phe Leu Arg Gln Ala Leu Gly  
145 150 155 160

Val Glu Val Leu Ser His Val Ile Ser Ile Gly Ala Ser Ala Pro Tyr  
165 170 175

Glu Gly Pro Pro Arg Ala Glu Asp Leu Pro Ala Ile Asp Ala Ser  
180 185 190

Pro Val Arg Ala Tyr Asp Lys Ala Ala Glu Ala Asp Met Ile Ala Gln  
195 200 205

Ile Glu Ala Ala Lys Lys Asp Gly Asp Thr Leu Gly Gly Val Val Glu  
210 215 220

Ala Val Ala Leu Gly Leu Pro Val Gly Leu Gly Ser Phe Thr Ser Gly  
225 230 235 240

Asp His Arg Leu Asp Ser Gln Leu Ala Ala Ala Val Met Gly Ile Gln  
245 250 255

Ala Ile Lys Gly Val Glu Ile Gly Asp Gly Phe Gln Thr Ala Arg Arg  
260 265 270

Arg Gly Ser Arg Ala His Asp Glu Met Tyr Pro Gly Pro Asp Gly Val  
275 280 285

Val Arg Ser Thr Asn Arg Ala Gly Gly Leu Glu Gly Gly Met Thr Asn  
Page 12

E.coli. seq. 1.ST25.txt  
300

290

295

Gly Gln Pro Leu Arg Val Arg Ala Ala Met Lys Pro Ile Ser Thr Val  
305 310 315 320Pro Arg Ala Leu Ala Thr Val Asp Leu Ala Thr Gly Asp Glu Ala Val  
325 330 335Ala Ile His Gln Arg Ser Asp Val Cys Ala Val Pro Ala Ala Gly Val  
340 345 350Val Val Glu Thr Met Val Ala Leu Val Leu Ala Arg Ala Ala Leu Glu  
355 360 365Lys Phe Gly Gly Asp Ser Leu Ala Glu Thr Gln Arg Asn Ile Ala Ala  
370 375 380Tyr Gln Arg Ser Val Ala Asp Arg Glu Ala Pro Ala Ala Arg Val Ser  
385 390 395 400

Gly

<210> 8  
<211> 360  
<212> PRT  
<213> Salmonella enterica

&lt;400&gt; 8

Ala Gly Asn Thr Ile Gly Gln Leu Phe Arg Val Thr Thr Phe Gly Glu  
1 5 10 15Ser His Gly Leu Ala Val Gly Gly Ile Val Asp Gly Val Pro Pro Gly  
20 25 30Ile Pro Leu Thr Glu Ala Asp Leu Gln His Asp Leu Asp Arg Arg Arg  
35 40 45Pro Gly Thr Ser Arg Tyr Thr Thr Gln Arg Arg Glu Pro Asp Gln Val  
50 55 60Lys Ile Leu Ser Gly Val Phe Asp Gly Val Thr Thr Gly Thr Ser Ile  
65 70 75 80Gly Leu Leu Ile Glu Asn Thr Asp Gln Arg Ser Gln Asp Tyr Ser Ala  
85 90 95Ile Lys Asp Val Phe Arg Pro Gly His Ala Asp Tyr Thr Tyr Glu Gln  
Page 13

100

E.coli. seq. 1.ST25.txt  
105 110

Lys Tyr Gly Leu Arg Asp Tyr Arg Gly Gly Gly Arg Ser Ser Ala Arg  
115 120 125  
Glu Thr Ala Met Arg Val Ala Ala Gly Ala Ile Ala Lys Lys Tyr Leu  
130 135 140  
Ala Glu Lys Phe Gly Ile Glu Ile Arg Gly Cys Leu Thr Gln Met Gly  
145 150 155 160  
Asp Ile Pro Leu Glu Ile Lys Asp Trp Arg Gln Val Glu Leu Asn Pro  
165 170 175  
Phe Phe Cys Pro Asp Ala Asp Lys Leu Asp Ala Leu Asp Glu Leu Met  
180 185 190  
Arg Ala Leu Lys Lys Glu Gly Asp Ser Ile Gly Ala Lys Val Thr Val  
195 200 205  
Met Ala Ser Gly Val Pro Ala Gly Leu Gly Glu Pro Val Phe Asp Arg  
210 215 220  
Leu Asp Ala Asp Ile Ala His Ala Leu Met Ser Ile Asn Ala Val Lys  
225 230 235 240  
Gly Val Glu Ile Gly Glu Gly Phe Asn Val Val Ala Leu Arg Gly Ser  
245 250 255  
Gln Asn Arg Asp Glu Ile Thr Ala Gln Gly Phe Gln Ser Asn His Ala  
260 265 270  
Gly Gly Ile Leu Gly Gly Ile Ser Ser Gly Gln His Ile Val Ala His  
275 280 285  
Met Ala Leu Lys Pro Thr Ser Ser Ile Thr Val Pro Gly Arg Thr Ile  
290 295 300  
Asn Arg Met Gly Glu Glu Val Glu Met Ile Thr Lys Gly Arg His Asp  
305 310 315 320  
Pro Cys Val Gly Ile Arg Ala Val Pro Ile Ala Glu Ala Met Leu Ala  
325 330 335  
Ile Val Leu Met Asp His Leu Leu Arg His Arg Ala Gln Asn Ala Asp  
340 345 350

Page 14

E.coli. seq. 1.ST25.txt

Val Lys Thr Glu Ile Pro Arg Trp  
355 360<210> 9  
<211> 360  
<212> PRT  
<213> yersinia pestis

&lt;400&gt; 9

Ala Gly Asn Ser Ile Gly Gln Phe Phe Arg Val Thr Thr Phe Gly Glu  
1 5 10 15Ser His Gly Ile Ala Leu Gly Cys Ile Ile Asp Gly Val Pro Pro Gly  
20 25 30Ile Pro Ile Thr Glu Ala Asp Ile Gln Leu Asp Leu Asp Arg Arg Arg  
35 40 45Pro Gly Thr Ser Arg Tyr Thr Thr Gln Arg Arg Glu Leu Asp Gln Val  
50 55 60Arg Ile Leu Ser Gly Val Phe Glu Gly Val Thr Thr Gly Thr Ser Ile  
65 70 75 80Gly Leu Met Ile Glu Asn Thr Asp Gln Arg Ser Gln Asp Tyr Ser Ala  
85 90 95Ile Lys Asp Val Phe Arg Pro Gly His Ala Asp Tyr Thr Tyr Glu Gln  
100 105 110Lys Tyr Gly Val Arg Asp Tyr Arg Gly Gly Gly Arg Ser Ser Ala Arg  
115 120 125Glu Thr Ala Met Arg Val Ala Ala Gly Ala Ile Ala Lys Lys Tyr Leu  
130 135 140Ala Gln Lys Phe Gly Val Gln Val Arg Gly Tyr Leu Ala Gln Met Gly  
145 150 155 160Asp Val Ser Cys Asp Leu Leu Asp Trp Asp Leu Val Glu Gln Asn Pro  
165 170 175Phe Phe Cys Pro Asp Ala Ser Lys Leu Glu Pro Leu Asp Ala Leu Met  
180 185 190Arg Glu Leu Lys Lys Ala Gly Asp Ser Ile Gly Ala Lys Ile Thr Val  
195 200 205

## E.coli. seq. 1.ST25.txt

Val Ala Glu Asn Val Pro Val Gly Leu Gly Glu Pro Val Phe Asp Arg  
210 215 220

Leu Asp Ala Asp Leu Ala His Ala Leu Met Ser Ile Asn Ala Val Lys  
225 230 235 240

Gly Val Glu Ile Gly Asp Gly Phe Ala Val Val Thr Lys Arg Gly Ser  
245 250 255

Glu Asn Arg Asp Glu Ile Thr Pro Gln Gly Phe Gln Ser Asn His Ala  
260 265 270

Gly Gly Ile Leu Gly Gly Ile Ser Ser Gly Gln Pro Val Val Ala His  
275 280 285

Ile Ala Leu Lys Pro Thr Ser Ser Ile Met Val Pro Gly Gln Thr Ile  
290 295 300

Asn Arg Gln Gly Glu Ala Val Glu Met Val Thr Arg Gly Arg His Asp  
305 310 315 320

Pro Cys Val Gly Ile Arg Ala Val Pro Ile Ala Glu Ala Met Met Ala  
325 330 335

Ile Val Leu Met Asp His Leu Leu Arg Gln Arg Ala Gln Cys Gly Asp  
340 345 350

Val Ala Ser Asp Val Pro Arg Trp  
355 360

<210> 10  
<211> 356  
<212> PRT  
<213> Haemophilus influenzae

<400> 10

Ala Gly Asn Thr Ile Gly Gln Leu Phe Arg Val Thr Thr Phe Gly Glu  
1 5 10 15

Ser His Gly Ile Ala Leu Gly Cys Ile Val Asp Gly Val Pro Pro Asn  
20 25 30

Leu Glu Leu Ser Glu Lys Asp Ile Gln Pro Asp Leu Asp Arg Arg Lys  
35 40 45

Pro Gly Thr Ser Arg Tyr Thr Thr Pro Arg Arg Glu Asp Asp Glu Val  
50 55 60



## E.coli. seq. 1.ST25.txt

Gln Ile Leu Ser Gly Val Phe Glu Gly Lys Thr Thr Gly Thr Ser Ile  
 65 70 75 80  
 Gly Met Ile Ile Lys Asn Gly Asp Gln Arg Ser Gln Asp Tyr Gly Asp  
 85 90 95  
 Ile Lys Asp Arg Phe Arg Pro Gly His Ala Asp Phe Thr Tyr Gln Gln  
 100 105 110  
 Lys Tyr Gly Ile Arg Asp Tyr Arg Gly Gly Gly Arg Ser Ser Ala Arg  
 115 120 125  
 Glu Thr Ala Met Arg Val Ala Ala Gly Ala Ile Ala Lys Lys Tyr Leu  
 130 135 140  
 Arg Glu His Phe Gly Ile Glu Val Arg Gly Phe Leu Ser Gln Ile Gly  
 145 150 155 160  
 Asn Ile Lys Ile Ala Pro Gln Lys Val Gly Gln Ile Asp Trp Glu Lys  
 165 170 175  
 Val Asn Ser Asn Pro Phe Phe Cys Pro Asp Glu Ser Ala Val Glu Lys  
 180 185 190  
 Phe Asp Glu Leu Ile Arg Glu Leu Lys Lys Glu Gly Asp Ser Ile Gly  
 195 200 205  
 Ala Lys Leu Thr Val Ile Ala Glu Asn Val Pro Val Gly Leu Gly Glu  
 210 215 220  
 Pro Val Phe Asp Arg Leu Asp Ala Asp Leu Ala His Ala Leu Met Gly  
 225 230 235 240  
 Ile Asn Ala Val Lys Gly Val Glu Ile Gly Asp Gly Phe Ala Val Val  
 245 250 255  
 Glu Gln Arg Gly Ser Glu His Arg Asp Glu Met Thr Pro Asn Gly Phe  
 260 265 270  
 Glu Ser Asn His Ala Gly Gly Ile Leu Gly Gly Ile Ser Ser Gly Gln  
 275 280 285  
 Pro Ile Ile Ala Thr Ile Ala Leu Lys Pro Thr Ser Ser Ile Thr Ile  
 290 295 300  
 Pro Gly Arg Ser Ile Asn Leu Asn Gly Glu Ala Val Glu Val Val Thr  
 305 310 315 320

## E.coli. seq. 1.ST25.txt

Lys Gly Arg His Asp Pro Cys Val Gly Ile Arg Ala Val Pro Ile Ala  
 325 330 335

Glu Ala Met Val Ala Ile Val Leu Leu Asp His Leu Leu Arg Phe Lys  
 340 345 350

Ala Gln Cys Lys  
 355

<210> 11  
 <211> 343  
 <212> PRT  
 <213> Pasteurella multocida

<400> 11

Thr Phe Gly Glu Ser His Gly Ile Ala Leu Gly Cys Ile Val Asp Gly  
 1 5 10 15

Val Pro Pro Gly Leu Ser Leu Ser Glu Ala Asp Ile Gln Pro Asp Leu  
 20 25 30

Asp Arg Arg Lys Pro Gly Thr Ser Arg Tyr Thr Thr Pro Arg Arg Glu  
 35 40 45

Asp Asp Glu Val Gln Ile Leu Ser Gly Val Phe Glu Gly Lys Thr Thr  
 50 55 60

Gly Thr Ser Ile Gly Met Ile Ile Lys Asn Ala Asp Gln Arg Ser Gln  
 65 70 75 80

Asp Tyr Gly Asp Ile Lys Asp Arg Phe Arg Pro Gly His Ala Asp Phe  
 85 90 95

Thr Tyr Gln Gln Lys Tyr Gly Ile Arg Asp Tyr Arg Gly Gly Gly Arg  
 100 105 110

Ser Ser Ala Arg Glu Thr Ala Met Arg Val Ala Ala Gly Ala Ile Ala  
 115 120 125

Lys Lys Tyr Leu Arg Glu His Phe Gly Val Glu Val Arg Gly Phe Leu  
 130 135 140

Ala Gln Ile Gly Asp Val Ala Ile Ala Pro Gln Val Ile Glu Gln Ile  
 145 150 155 160

Asp Trp Gln Gln Val Asn Ser Asn Pro Phe Phe Cys Pro Asp Pro Ser  
 165 170 175

## E.coli. seq. 1.ST25.txt

Ala Val Glu Lys Phe Asp Glu Leu Ile Arg Gln Leu Lys Lys Glu Gly  
 180 185 190

Asp Ser Ile Gly Ala Lys Leu Thr Val Val Ala Glu Asn Val Pro Val  
 195 200 205

Gly Leu Gly Glu Pro Val Phe Asp Arg Leu Asp Ala Asp Leu Ala His  
 210 215 220

Ala Leu Met Gly Ile Asn Ala Val Lys Ala Val Glu Ile Gly Asp Gly  
 225 230 235 240

Phe Ala Val Val Asn Gln Arg Gly Ser Ala His Arg Asp Glu Met Thr  
 245 250 255

Pro Glu Gly Phe Leu Ser Asn His Ala Gly Gly Ile Leu Gly Gly Ile  
 260 265 270

Ser Ser Gly Gln Pro Ile Val Ala Thr Ile Ala Leu Lys Pro Thr Ser  
 275 280 285

Ser Ile Thr Ile Pro Gly Arg Ser Val Asn Leu Ala Asn Glu Pro Val  
 290 295 300

Glu Val Ile Thr Lys Gly Arg His Asp Pro Cys Val Gly Ile Arg Ala  
 305 310 315 320

Val Pro Ile Ala Glu Ala Met Val Ala Ile Val Leu Leu Asp His Leu  
 325 330 335

Leu Arg His Lys Ala Gln Asn  
 340

<210> 12  
 <211> 358  
 <212> PRT  
 <213> Neisseria gonorrhoeae

<400> 12

Ala Gly Asn Thr Phe Gly Gln Ile Phe Thr Val Thr Thr Phe Gly Glu  
 1 5 10 15

Ser His Gly Ala Gly Leu Gly Cys Ile Ile Asp Gly Cys Pro Pro Gly  
 20 25 30

Leu Glu Leu Ser Glu Ala Asp Ile Gln Phe Asp Leu Asp Arg Arg Lys  
 35 40 45

## E.coli. seq. 1.ST25.txt

Pro Gly Thr Ser Arg His Val Thr Gln Arg Arg Glu Ala Asp Gln Val  
 50 55 60  
 Glu Ile Leu Ser Gly Val Phe Glu Gly Lys Thr Thr Gly Thr Pro Ile  
 65 70 75 80  
 Ala Leu Leu Ile Arg Asn Thr Asp Gln Arg Ser Glu Asp Tyr Gly Asp  
 85 90 95  
 Ile Ala Thr Ala Phe Arg Pro Gly His Ala Asp Tyr Thr Tyr Trp His  
 100 105 110  
 Lys Tyr Gly Thr Arg Asp Tyr Arg Gly Gly Gly Arg Ser Ser Ala Arg  
 115 120 125  
 Glu Thr Ala Ala Arg Val Ala Ala Gly Ala Val Ala Lys Lys Trp Leu  
 130 135 140  
 Lys Glu Lys Phe Gly Thr Glu Ile Thr Ala Tyr Val Thr Gln Val Gly  
 145 150 155 160  
 Glu Lys Lys Ile Arg Phe Glu Gly Ser Glu His Ile Ser Gln Asn Pro  
 165 170 175  
 Phe Phe Ala Ala Asn Gln Ser Gln Ile Ala Glu Leu Glu His Tyr Met  
 180 185 190  
 Asp Gly Val Arg Lys Ser Leu Asp Ser Val Gly Ala Lys Leu His Ile  
 195 200 205  
 Glu Ala Ala Asn Val Pro Val Gly Leu Gly Glu Pro Val Phe Asp Arg  
 210 215 220  
 Leu Asp Ala Glu Ile Ala Tyr Ala Met Met Gly Ile Asn Ala Val Lys  
 225 230 235 240  
 Gly Val Glu Ile Gly Ala Gly Phe Asp Ser Val Thr Gln Arg Gly Ser  
 245 250 255  
 Glu His Gly Asp Glu Leu Thr Pro Gln Gly Phe Leu Ser Asn His Ser  
 260 265 270  
 Gly Gly Ile Leu Gly Gly Ile Ser Thr Gly Gln Asp Ile Cys Val Asn  
 275 280 285  
 Ile Ala Ile Lys Pro Thr Ser Ser Ile Ala Thr Pro Arg Arg Ser Ile  
 290 295 300

Page 20

## E.coli. seq. 1.ST25.txt

Asp Ile His Gly Asn Pro Val Glu Leu Ala Thr Arg Gly Arg His Asp  
305 310 315 320

Pro Cys Val Gly Leu Arg Thr Ala Pro Ile Ala Glu Ala Met Leu Ala  
325 330 335

Leu Val Leu Ile Asp His Ala Leu Arg His Arg Ala Gln Asn Ala Asp  
340 345 350

Val Ala Ala Asp Thr Pro  
355

<210> 13  
<211> 358  
<212> PRT  
<213> Neisseria meningitidis

<400> 13

Ala Gly Asn Thr Phe Gly Gln Leu Phe Thr Val Thr Thr Phe Gly Glu  
1 5 10 15

Ser His Gly Ala Gly Leu Gly Cys Ile Ile Asp Gly Cys Pro Pro Gly  
20 25 30

Leu Glu Leu Ser Glu Ala Asp Ile Gln Phe Asp Leu Asp Arg Arg Lys  
35 40 45

Pro Gly Thr Ser Arg His Val Thr Gln Arg Arg Glu Ala Asp Gln Val  
50 55 60

Glu Ile Leu Ser Gly Val Phe Glu Gly Lys Thr Thr Gly Thr Pro Ile  
65 70 75 80

Ala Leu Leu Ile Arg Asn Thr Asp Gln Arg Ser Lys Asp Tyr Gly Asn  
85 90 95

Ile Ala Thr Ser Phe Arg Pro Gly His Ala Asp Tyr Thr Tyr Trp His  
100 105 110

Lys Tyr Gly Thr Arg Asp Tyr Arg Gly Gly Gly Arg Ser Ser Ala Arg  
115 120 125

Glu Thr Ala Ala Arg Val Ala Ala Gly Ala Val Ala Lys Lys Trp Leu  
130 135 140

Lys Glu Lys Phe Gly Thr Glu Ile Thr Ala Tyr Val Thr Gln Val Gly  
145 150 155 160

Page 21

## E.coli. seq. 1.ST25.txt

Glu Lys Glu Ile Arg Phe Glu Gly Cys Glu His Ile Ser Gln Asn Pro  
165 170 175

Phe Phe Ala Ala Asn His Ser Gln Ile Ala Glu Leu Glu Asn Tyr Met  
180 185 190

Asp Ser Val Arg Lys Ser Leu Asp Ser Val Gly Ala Lys Leu His Ile  
195 200 205

Glu Ala Ala Asn Val Pro Val Gly Leu Gly Glu Pro Val Phe Asp Arg  
210 215 220

Leu Asp Ala Glu Ile Ala Tyr Ala Met Met Gly Ile Asn Ala Val Lys  
225 230 235 240

Gly Val Glu Ile Gly Ala Gly Phe Asp Ser Val Thr Gln Arg Gly Ser  
245 250 255

Glu His Gly Asp Glu Leu Thr Pro Gln Gly Phe Leu Ser Asn His Ser  
260 265 270

Gly Gly Ile Leu Gly Gly Ile Ser Thr Gly Gln Asp Ile His Val Asn  
275 280 285

Ile Ala Ile Lys Pro Thr Ser Ser Ile Ala Thr Pro Arg Arg Ser Ile  
290 295 300

Asp Ile Asn Gly Asn Pro Ile Glu Leu Ala Thr His Gly Arg His Asp  
305 310 315 320

Pro Cys Val Gly Leu Arg Ala Ala Pro Ile Ala Glu Ala Met Leu Ala  
325 330 335

Leu Val Leu Ile Asp His Ala Leu Arg His Arg Ala Gln Asn Ala Asp  
340 345 350

Val Gln Val Asn Thr Pro  
355

<210> 14  
<211> 357  
<212> PRT  
<213> Pseudomonas aeruginosa

<400> 14

Ser Gly Asn Thr Tyr Gly Lys Leu Phe Thr Val Thr Thr Ala Gly Glu  
1 5 10 15

## E.coli. seq. 1.ST25.txt

Ser His Gly Pro Ala Leu Val Ala Ile Val Asp Gly Cys Pro Pro Gly  
 20 25 30

Leu Glu Leu Ser Ala Arg Asp Leu Gln Arg Asp Leu Asp Arg Arg Asn  
 35 40 45

Pro Gly Thr Ser Arg His Thr Thr Gln Arg Gln Glu Ala Asp Glu Val  
 50 55 60

Glu Ile Leu Ser Gly Val Phe Glu Gly Lys Thr Thr Gly Thr Pro Ile  
 65 70 75 80

Gly Leu Leu Ile Arg Asn Thr Asp Gln Lys Ser Lys Asp Tyr Ser Ala  
 85 90 95

Ile Lys Asp Leu Phe Arg Pro Ala His Ala Asp Tyr Thr Tyr His His  
 100 105 110

Lys Tyr Gly Val Arg Asp Tyr Arg Gly Gly Gly Arg Ser Ser Ala Arg  
 115 120 125

Glu Thr Ala Met Arg Val Ala Ala Gly Ala Ile Ala Lys Lys Tyr Leu  
 130 135 140

Ala Gly Leu Gly Ile Gln Val Arg Gly Tyr Met Ser Gln Leu Gly Pro  
 145 150 155 160

Ile Glu Ile Pro Phe Arg Ser Trp Asp Ser Val Glu Gln Asn Ala Phe  
 165 170 175

Phe Ser Pro Asp Pro Asp Lys Val Pro Glu Leu Glu Ala Tyr Met Asp  
 180 185 190

Gln Leu Arg Arg Asp Gln Asp Ser Val Gly Ala Lys Ile Thr Val Val  
 195 200 205

Ala Glu Cys Val Pro Pro Gly Leu Gly Glu Pro Ile Phe Asp Arg Leu  
 210 215 220

Asp Ala Glu Leu Ala His Ala Leu Met Ser Ile Asn Ala Val Lys Gly  
 225 230 235 240

Val Glu Ile Gly Ala Pro Phe Ala Ser Ile Ala Gln Arg Gly Thr Glu  
 245 250 255

His Arg Asp Glu Leu Thr Pro Gln Gly Phe Leu Ser Asn Asn Ala Gly  
 Page 23

E.coli. seq. 1.ST25.txt  
265 270

260

Gly Ile Leu Gly Gly Ile Ser Ser Gly Gln Pro Ile Val Ala His Leu  
275 280 285

Ala Leu Lys Pro Thr Ser Ser Ile Thr Thr Pro Gly Arg Ser Ile Asp  
290 295 300

Thr Ala Gly Glu Pro Val Asp Met Ile Thr Lys Gly Arg His Asp Pro  
305 310 315 320

Cys Val Gly Ile Arg Ala Thr Pro Ile Ala Glu Ala Met Met Ala Ile  
325 330 335

Val Leu Leu Asp Gln Leu Val Arg Gln Arg Gly Gln Asn Ala Asp Val  
340 345 350

Arg Val Asp Thr Pro  
355

<210> 15  
<211> 361  
<212> PRT  
<213> Helicobacter pylori

<400> 15

Met Asn Thr Leu Gly Arg Phe Leu Arg Leu Thr Thr Phe Gly Glu Ser  
1 5 10 15

His Gly Asp Met Ile Gly Gly Val Leu Asp Gly Met Pro Ser Gly Ile  
20 25 30

Lys Ile Asp Tyr Asp Leu Leu Glu Asn Glu Met Lys Arg Arg Gln Gly  
35 40 45

Gly Arg Asn Pro Arg Lys Glu Asp Asp Lys Val Glu Ile Thr Ser Gly  
50 55 60

Val Phe Glu Asp Phe Ser Thr Gly Thr Pro Ile Gly Phe Leu Ile His  
65 70 75 80

Asn Gln Arg Ala Arg Ser Lys Asp Tyr Asp Asn Ile Lys Asn Leu Phe  
85 90 95

Arg Pro Ser His Ala Asp Phe Thr Tyr Phe His Lys Tyr Gly Ile Arg  
100 105 110

Asp Phe Arg Gly Gly Gly Arg Ser Ser Ala Arg Glu Ser Ala Ile Arg  
Page 24



E.coli. seq. 1.ST25.txt															
115						120						125			
Val	Ala 130	Ala	Gly	Ala	Phe	Ala 135	Lys	Met	Leu	Leu	Arg 140	Glu	Ile	Gly	Ile
Val 145	Cys	Glu	Ser	Gly	Ile 150	Ile	Glu	Ile	Gly	Gly 155	Ile	Lys	Ala	Lys	Asn 160
Tyr	Asp	Phe	Asn	His 165	Ala	Leu	Lys	Ser	Glu 170	Ile	Phe	Ala	Leu	Asp 175	Glu
Glu	Gln	Glu	Glu 180	Ala	Gln	Lys	Thr	Ala 185	Ile	Gln	Asn	Ala	Ile 190	Lys	Asn
His	Asp	Ser 195	Ile	Gly	Gly	Val	Ala 200	Leu	Ile	Arg	Ala	Arg 205	Ser	Ile	Lys
Thr	Asn 210	Gln	Lys	Leu	Pro	Ile 215	Gly	Leu	Gly	Gln	Gly 220	Leu	Tyr	Ala	Lys
Leu 225	Asp	Ala	Lys	Ile	Ala 230	Glu	Ala	Met	Met	Gly 235	Leu	Asn	Gly	Val	Lys 240
Ala	Val	Glu	Ile	Gly 245	Lys	Gly	Val	Glu	Ser 250	Ser	Leu	Leu	Lys	Gly 255	Ser
Glu	Tyr	Asn	Asp 260	Leu	Met	Asp	Gln	Lys 265	Gly	Phe	Leu	Ser	Asn 270	Arg	Ser
Gly	Gly	Val 275	Leu	Gly	Gly	Met	Ser 280	Asn	Gly	Glu	Glu	Ile 285	Ile	Val	Lys
Val	His 290	Phe	Lys	Pro	Thr	Pro 295	Ser	Ile	Phe	Gln	Pro 300	Gln	Arg	Thr	Ile
Asp 305	Ile	Asn	Gly	Asn	Glu 310	Cys	Glu	Cys	Leu	Leu 315	Lys	Gly	Arg	His	Asp 320
Pro	Cys	Ile	Ala	Ile 325	Arg	Gly	Ser	Val	Val 330	Cys	Glu	Ser	Leu	Leu 335	Ala
Leu	Val	Leu	Ala 340	Asp	Met	Val	Leu	Leu 345	Asn	Leu	Thr	Ser	Lys 350	Ile	Glu
Tyr	Leu	Lys 355	Thr	Ile	Tyr	Asn	Glu 360	Asn							

## E.coli. seq. 1.ST25.txt

<210> 16  
 <211> 432  
 <212> PRT  
 <213> Neurospora crassa

<400> 16

Met Ser Thr Phe Gly His Tyr Phe Arg Val Thr Thr Tyr Gly Glu Ser  
 1 5 10 15

His Cys Lys Ser Val Gly Cys Ile Val Asp Gly Val Pro Pro Gly Met  
 20 25 30

Glu Leu Thr Glu Asp Asp Ile Gln Pro Gln Met Thr Arg Arg Arg Pro  
 35 40 45

Gly Gln Ser Ala Ile Thr Thr Pro Arg Asp Glu Lys Asp Arg Val Ile  
 50 55 60

Ile Gln Ser Gly Thr Glu Phe Gly Val Thr Leu Gly Thr Pro Ile Gly  
 65 70 75 80

Met Leu Val Met Asn Glu Asp Gln Pro Pro Lys Asp Tyr Gly Asn Lys  
 85 90 95

Thr Met Asp Ile Tyr Pro Arg Pro Ser His Ala Asp Trp Thr Tyr Leu  
 100 105 110

Glu Lys Tyr Gly Val Lys Ala Ser Ser Gly Gly Gly Arg Ser Ser Ala  
 115 120 125

Arg Glu Thr Ile Gly Arg Val Ala Ala Gly Ala Ile Ala Glu Lys Tyr  
 130 135 140

Leu Lys Pro Arg Tyr Gly Val Glu Ile Val Ala Phe Val Ser Ser Val  
 145 150 155 160

Gly Ser Glu His Leu Phe Pro Pro Thr Ala Glu His Pro Ser Pro Ser  
 165 170 175

Thr Asn Pro Glu Phe Leu Lys Leu Val Asn Ser Ile Thr Arg Glu Thr  
 180 185 190

Val Asp Ser Phe Leu Pro Val Arg Cys Pro Asp Ala Glu Ala Asn Lys  
 195 200 205

Arg Met Glu Asp Leu Ile Thr Lys Phe Arg Asp Asn His Asp Ser Ile  
 210 215 220

E.coli. seq. 1.ST25.txt

Gly Gly Thr Val Thr Cys Val Ile Arg Asn Val Pro Ser Gly Leu Gly  
 225 230 235 240

Glu Pro Ala Phe Asp Lys Leu Glu Ala Met Leu Ala His Ala Met Leu  
 245 250 255

Ser Ile Pro Ala Thr Lys Gly Phe Glu Val Gly Ser Gly Phe Gly Gly  
 260 265 270

Cys Glu Val Pro Gly Ser Ile His Asn Asp Pro Phe Val Ser Ala Glu  
 275 280 285

Asn Thr Glu Ile Pro Pro Ser Val Ala Ala Ser Gly Ala Ala Arg Asn  
 290 295 300

Gly Ile Pro Arg Pro Lys Leu Thr Thr Lys Thr Asn Phe Ser Gly Gly  
 305 310 315 320

Ile Gln Gly Gly Ile Ser Asn Gly Ala Pro Ile Tyr Phe Arg Val Gly  
 325 330 335

Phe Lys Pro Ala Ala Thr Ile Gly Gln Glu Gln Thr Thr Ala Thr Tyr  
 340 345 350

Asp Gly Thr Ser Glu Gly Val Leu Ala Ala Lys Gly Arg His Asp Pro  
 355 360 365

Ser Val Val Pro Arg Ala Val Pro Ile Val Glu Ala Met Ala Ala Leu  
 370 375 380

Val Ile Met Asp Ala Val Leu Ala His Glu Ala Arg Val Thr Ala Lys  
 385 390 395 400

Ser Leu Leu Pro Pro Leu Lys Gln Thr Ile Asn Ser Gly Lys Asp Thr  
 405 410 415

Val Gly Asn Gly Val Ser Glu Asn Val Gln Glu Ser Asp Leu Ala Gln  
 420 425 430

&lt;210&gt; 17

&lt;211&gt; 435

&lt;212&gt; PRT

&lt;213&gt; Arabidopsis thaliana

&lt;400&gt; 17

Met Ala Ser Ser Ser Leu Thr Ser Lys Ser Ile Leu Gly Ser Thr Lys  
 1 5 10 15

## E.coli. seq. 1.ST25.txt

Leu Gly Ser Ser Ser Leu Pro Ser Glu Leu Arg Arg Leu Ser Ser Pro  
 20 25 30  
 Ala Val Gln Ile Ser Leu Arg Thr Gln Thr Arg Lys Asn Phe Gln Ile  
 35 40 45  
 Gln Ala Thr Gly Ser Ser Tyr Gly Thr His Phe Arg Val Ser Thr Phe  
 50 55 60  
 Gly Glu Ser His Gly Gly Gly Val Gly Cys Ile Ile Asp Gly Cys Pro  
 65 70 75 80  
 Pro Arg Ile Pro Leu Thr Glu Ser Asp Leu Gln Phe Asp Leu Asp Arg  
 85 90 95  
 Arg Pro Gly Gln Ser Arg Ile Thr Thr Pro Arg Lys Glu Thr Asp Thr  
 100 105 110  
 Cys Arg Ile Ser Ser Gly Val Ser Glu Gly Met Thr Thr Gly Thr Pro  
 115 120 125  
 Ile His Val Phe Val Pro Asn Thr Asp Gln Arg Gly Leu Asp Tyr Ser  
 130 135 140  
 Glu Met Ser Val Ala Tyr Arg Pro Ser His Ala Asp Ala Thr Tyr Asp  
 145 150 155 160  
 Met Lys Tyr Gly Val Arg Ser Val Gln Gly Gly Gly Arg Ser Ser Ala  
 165 170 175  
 Arg Glu Thr Ile Gly Arg Val Ala Pro Gly Ala Leu Ala Lys Lys Ile  
 180 185 190  
 Leu Lys Gln Phe Ala Gly Thr Glu Ile Leu Ala Tyr Val Ser Gln Val  
 195 200 205  
 His His Val Val Leu Pro Glu Glu Leu Val Asp His Glu Asn Leu Thr  
 210 215 220  
 Leu Glu Gln Ile Glu Asn Asn Ile Val Arg Cys Pro Asn Pro Glu Tyr  
 225 230 235 240  
 Ala Glu Lys Met Ile Ala Ala Ile Asp Ala Val Arg Thr Lys Gly Asn  
 245 250 255  
 Ser Val Gly Gly Val Val Thr Cys Ile Val Arg Asn Ala Pro Arg Gly  
 260 265 270

## E.coli. seq. 1.ST25.txt

Leu Gly Thr Pro Val Phe Asp Lys Leu Glu Ala Glu Leu Ala Lys Ala  
 275 280 285

Cys Met Ser Leu Pro Ala Thr Lys Gly Phe Glu Phe Gly Ser Gly Phe  
 290 295 300

Ala Gly Thr Phe Leu Thr Gly Leu Glu His Asn Asp Glu Phe Tyr Thr  
 305 310 315 320

Asp Glu Asn Gly Arg Ile Arg Thr Arg Thr Asn Arg Ser Gly Gly Ile  
 325 330 335

Gln Gly Gly Ile Ser Asn Gly Glu Ile Ile Asn Met Arg Val Ala Phe  
 340 345 350

Lys Pro Thr Ser Thr Ile Gly Arg Lys Gln Asn Thr Val Thr Arg Asp  
 355 360 365

Lys Val Glu Thr Glu Met Ile Ala Arg Gly Arg His Asp Pro Cys Val  
 370 375 380

Val Pro Arg Ala Val Pro Met Val Glu Ala Met Val Ala Leu Val Leu  
 385 390 395 400

Val Asp Gln Leu Met Ala Gln Tyr Ala Gln Cys His Leu Phe Pro Ile  
 405 410 415

Asn Pro Glu Leu Gln Glu Pro Leu Gln Ile Glu Gln Pro Gln Asn Ala  
 420 425 430

Thr Ala Leu  
 435

<210> 18  
 <211> 359  
 <212> PRT  
 <213> Clostridium difficile

<400> 18

Met Ser Gly Ile Trp Gly Asn Asn Leu Lys Val Ser Ile Phe Gly Glu  
 1 5 10 15

Ser His Gly Asn Ala Ile Gly Ile Asn Ile Asp Gly Leu Pro Ser Gly  
 20 25 30

Ile Glu Leu Asp Leu Asp Lys Ile Asp Lys Glu Met Lys Arg Arg Ala  
 35 40 45

## E.coli. seq. 1.ST25.txt

Pro Gly Lys Asn Ser Ile Ser Thr Ser Arg Asn Glu Ser Asp Ile Pro  
50 55 60

Glu Ile Leu Ser Gly Tyr Phe Asn Gly Arg Thr Thr Gly Thr Pro Leu  
65 70 75 80

Cys Ala Ile Ile Arg Asn Ser Asp Thr Arg Ser Lys Asp Tyr Gly Glu  
85 90 95

Leu Lys Asn Leu Met Arg Pro Gly His Ala Asp Phe Thr Gly Asn Val  
100 105 110

Arg Tyr Ser Gly Phe Asn Asp Tyr Arg Gly Gly Gly His Phe Ser Gly  
115 120 125

Arg Ile Thr Ala Pro Leu Val Phe Cys Gly Ala Ile Cys Lys Gln Ile  
130 135 140

Leu Ser Gln Lys Gly Ile Glu Ile Gly Ala His Ile Lys Lys Ile Lys  
145 150 155 160

Asn Ile Glu Asp Met Ser Phe Asp Tyr Val Asn Ile Ser Lys Gln Gln  
165 170 175

Leu Ser Asn Leu Gln Thr Leu Glu Leu Pro Leu Leu Asp Leu Ser Lys  
180 185 190

Glu Glu Ala Met Lys Asn Thr Ile Ile Asp Ala Lys Asn Gln Gly Asp  
195 200 205

Ser Val Gly Gly Ile Ile Glu Cys Ala Val Val Gly Ile Asn Val Gly  
210 215 220

Leu Gly Asn Pro Phe Phe Asp Ser Val Glu Ser Thr Leu Ser His Leu  
225 230 235 240

Leu Phe Ser Val Pro Ala Val Lys Gly Val Glu Phe Gly Leu Gly Phe  
245 250 255

Glu Leu Ala Asp Met Tyr Gly Ser Gln Ser Asn Asp Glu Met Tyr Tyr  
260 265 270

Glu Gly Asn Gln Val Lys Ser Lys Thr Asn Asn Asn Gly Gly Ile Ile  
275 280 285

Gly Gly Ile Thr Thr Gly Met Pro Ile Ile Phe Lys Val Ala Ile Lys  
290 295 300

Page 30

## E.coli. seq. 1.ST25.txt

Pro Thr Pro Ser Ile Ser Arg Gln Gln Asn Thr Val Asn Ile Lys Asp  
305 310 315 320

Lys Lys Asp Asp Ile Leu Tyr Ile Lys Gly Arg His Asp Pro Cys Ile  
325 330 335

Val Gln Arg Ala Ile Pro Val Ile Glu Ala Val Thr Ala Ile Gly Ile  
340 345 350

Phe Asp Leu Met Lys Gly Arg  
355

<210> 19

<211> 0

<212> PRT

<213> Toxoplasma gondii

<400> 19

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**